

# Library Security Through Networking of CCTV Surveillance: A Study of Sikkim University, Sikkim

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## Abstract

*This study examines the effectiveness of close circuit television security systems in university library with a focus on Sikkim University (SU) library, Sikkim. The study attempts to find out what close circuit television security systems are in use in university libraries and to ascertain the effectiveness of the close circuit television security devices in the libraries. The complex analogue CCTV has become even harder to understand with the introduction of digital compression techniques and networking.*

**Keywords:** CCTV, Library Security, Networking, RFID

## 1. Introduction

Library is a 'temple of learning' which plays a tremendous role in the development of society. But it is a universal fact that libraries are not safe and secure. Akinfolarin (1992) observed that one of the serious issues that has bothered librarians from the earliest times to the present is how to ensure the security of library materials, especially against their theft and mutilation.

In the explosion of publication age, most of the libraries especially academic libraries follow open access system which allows its users directly to stake to ensure optimum utilization of the knowledge resources available in the library. Academic libraries are the "heart" of the learning community, providing a place for students and faculty to do their research and advance their knowledge (Simmonds, 2001), so that, one major issue to academic libraries has been need to secure the valuable resources collected over time.

This is an electronic age and it has more impact on library management. Electronic security systems are devices that are used with the aid of electrical and electronic apparatus to secure library materials. They help libraries to control, minimize or avoid library material theft and unethical losses (Rajendran & Rathinasabapathy, 2007). Examples of electronic security systems installed in libraries are electronic surveillance camera (CCTV), 3M Electronic Security Systems (electronic security gates), Radio Frequency Identification (RFID) system, perimeter alarm system, etc.

## 2. CCTV Systems

In the last few years, Closed Circuit Televisions (CCTV) have undergone tremendous growth with the development of new technologies, products and concepts. The complex analogue CCTV has become even harder to understand with the introduction of digital compression techniques and networking. Television systems are now one of the most indispensable information and communication means in our daily life. They can be broadly classified as shown in Figure 1, and are used in a wide range of applications, including standard television broadcasts.



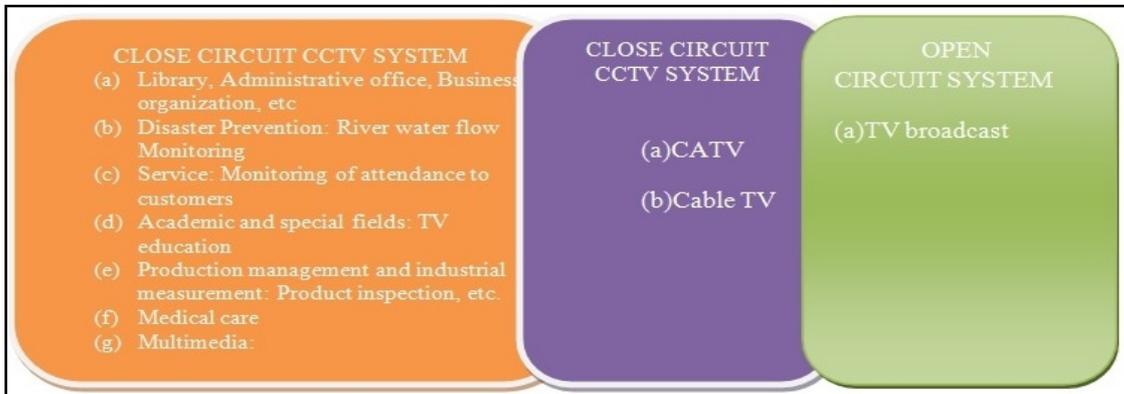


Figure 1: Classification of the CCTV systems

An open-circuit system refers to a system that is targeted at an indefinite number of people, as in television broadcasts. Closed-circuit systems, on the other hand, are designed to provide video to specified viewers. One closed-circuit system that is primarily designed for surveillance purposes is gener-

ally called a closed-circuit television or CCTV system. CCTV is used in a wide variety of applications which include security, disaster prevention, energy and manpower saving, sales promotion and information services, production management, industrial measurement, medical care, education and military fields.

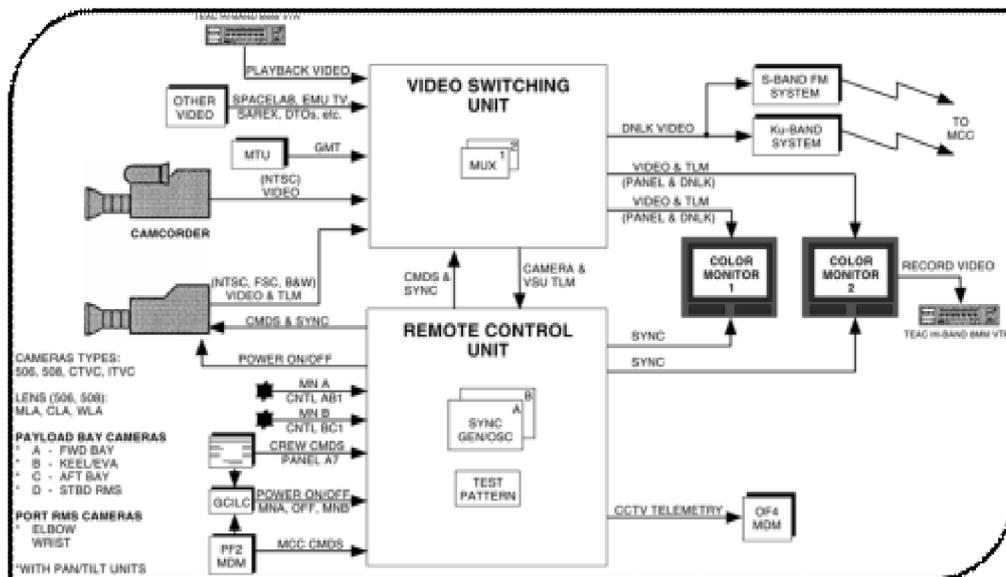


Figure 2: CCTV Overview

### 3. Evolution And Types Of CCTV

The human beings have used surveillance for centuries, and will also continue with it. Surveillance has been used in many ways in different countries over the years. But it has almost always been used to guard objects of value or to prevent certain things from happening. The first CCTV system was used in 1942 at test stand VII in Peenemuende, for the purpose of viewing the launching of V2- Rockets. As a result, CCTVs came into use in Rocket launching sites to film and records the scenes of rocket launching. At present, CCTV has become an indispensable accessory in organizational management in modern age. It provides digital or video recording of crime, violence, theft, antisocial behavior, etc.

There are three types of cameras: (1) Dome camera ( Fig. 3) - These are usually placed inside a dark dome and cannot be seen from outside. (2) Wall cameras – These are big visible units having many options like, waterproof, bulletproof, infrared light or zoom. (3) Hidden cameras- These are small and hidden inside other objects and are not easily detectable.



**Figure 3: Vari-focal dome color security camera.**

Fig. 3 shows a dome camera. It is an indoor color high-resolution mini dome camera with manual zoom lens. It provides manual zoom capability from 4mm to 8mm views. It can be operated with any standard video surveillance system.



**Figure 4: High resolution color indoor mini dome security camera**

Fig. 4 shows a mini dome camera. This camera provides 30-foot night vision, auto iris with 306 mm lens, and covers an area of 30 ft x30 ft, with 420 lines of resolution.



**Figure 5: High performance outdoor camera.**

Fig. 5 shows a high performance outdoor high resolution camera. It has 200-day color and 150-night vision security system, with long-range auto zoom lens. It is meant for all types of outdoor long-range video security applications.

### 4. Importance Of CCTV

The use of CCTV is necessary in the following activities:

- ❖ In chemical process industries, where the processes take place under dangerous conditions, CCTV should be installed to supervise and control accidents and disasters.
- ❖ Coalmines are one of the important places where CCTV is essential.
- ❖ The use of CCTV in places like Banks, Airports, Railway stations, city centers and other busy locations will not only provide security

but also help in planning the traffic control during rush periods.

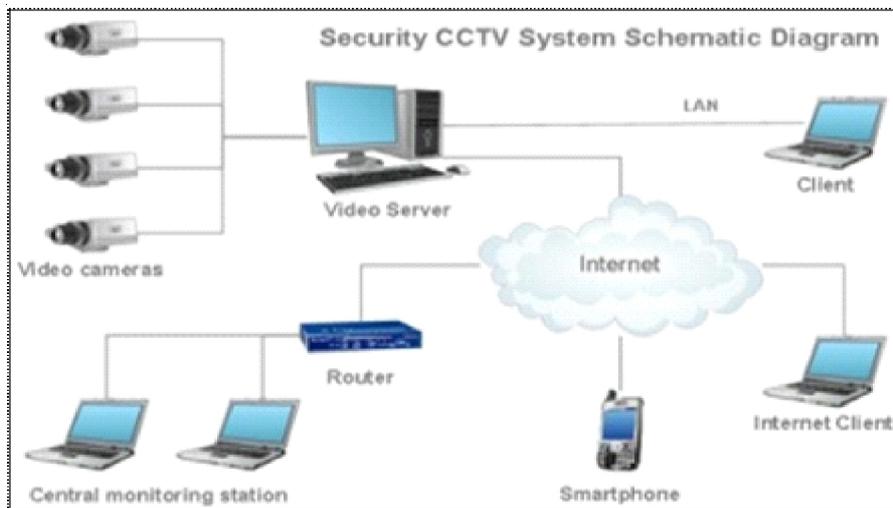
- ❖ The use of biometric systems is in progress for locking and unlocking of cars, office rooms and residences. Along with this system, if CCTV can be installed in car parking areas which can reduce car thefts to a great extent.
- ❖ In educational institutions, instead of inspecting the various departments and sections periodically, video surveillance and remote monitoring can be used for an effective management.
- ❖ The use of CCTV in warehouses, construction sites, gas stations, hospitals, shopping complexes, libraries, museums, archives, supermarkets, departmental stores and jewelry shops are quite successful.
- ❖ If railway stations and busy town centers of all the cities use CCTV, the crime can be reduced and traffic control will become easy.
- ❖ CCTV can be used in academic libraries to monitor the student activities and their behavior in the library. The common mischievous activities in the libraries like tearing of the pages from the books, hiding the books, sitting in corners and gossiping and book theft can be reduced to a great extent.

## 5. Library Security

Security systems are integrated systems made up of different types of equipment and devices, the combined operation of which helps protect human lives, property, the environment and information. Crime prevention literally represents preventing violation of the law and public interests and distur-

bances to social order through acts of crime, which should be punished by law. Crime prevention facilities and equipment are classified as shown in Figure 6 and long-distance picture transmission systems and surveillance camera systems are encompassed within CCTV systems designed for crime prevention. The aims of the installation of crime prevention facilities are to let criminals know the risks of crime and function as a deterrent of crime or keep constant watch over potential criminal acts. When a criminal act is detected, the facility's sensors or emergency warning switches are operated to sound an alarm and ideally cause criminals to go elsewhere. Thereafter, information is sent to related departments or personnel for taking appropriate measures to avoid loss.

Library security is a continuous process including several factors, which should follow a logical progression. Maximum traditional libraries have a security team headed by library security officer (LSO) who should meet regularly to discuss and deal with such matters as a security responsibility (Ramamurthy, 2001). The main motto of library security is to provide sufficient level of the security to most of the book collection, which is highly susceptible to theft and mutilation. Theft and mutilation of library materials is not a new problem not only in India but all over the world. Therefore, it is important to provide a safe and secure environment for resources and equipment. In this regard, the CCTV cameras are really a boon for the library staff.



**Figure 6: Shown the CCTV Security System**

## 6. Security Solutions

Dowlin (2004) also insists, that the modern academic library building must set new standards for seismic mitigation, ventilation, heating, lighting and openness of the building, security of the occupants, and collections, and ability to provide a comfortable environment for study, communication and programmes. Weber (1990) pleads with planners, architects and librarians that in planning and constructing library buildings, safety and general human well-being must receive utmost concerns including structural and existing human safety, safety of materials, lighting conditions and mobility by physically limited persons. Morris (1986) claims that, of all the precautionary measures libraries can take against such crimes (as vandalism, theft and incendiaries), none is more basic than that of securing the building itself. He goes on to suggest that security requirements should be clearly stated in the brief for a library building project and the librarian must be actively involved in scrutinizing the design for

all defects before the building becomes a security threat in future. In all, a library building must attract and not repel people to work in it because of serious structural and physical defects which are life-threatening.

Sikkim University has security personnel for guarding theft of all types of library document. Besides sharp eyed staff and security personnel, there are a variety of weapons available for library security (Ramamurthy, 2001). There are:-

- ❖ CCTV
- ❖ RFID
- ❖ Alarms on exit doors
- ❖ Sign-in sheets
- ❖ Placing facilities and equipments in high visibility areas

Sikkim University does not have a system of showing the identity card for accessing the library. Thus

is becomes possible for library users to mutilate the papers of valuable documents, misuse the reading room and steal the books. Hence, university library is using the CCTV camera system for video surveillance with help of library security.

**7. CCTV System Setup In Su Library**

CCTV camera technology comes in various varieties based on the need and types of infrastructure support available in the organizational CCTV systems. It is with analog support with coaxial cable, some cameras support the direct IP address so it can send data on the computer network. Based on

the best functions, Sikkim University library has setup analog based CCTV cameras provided to the digital video TV tuner card to automatically capture and store video recording on networked PC as well as on the analog television set for live video.

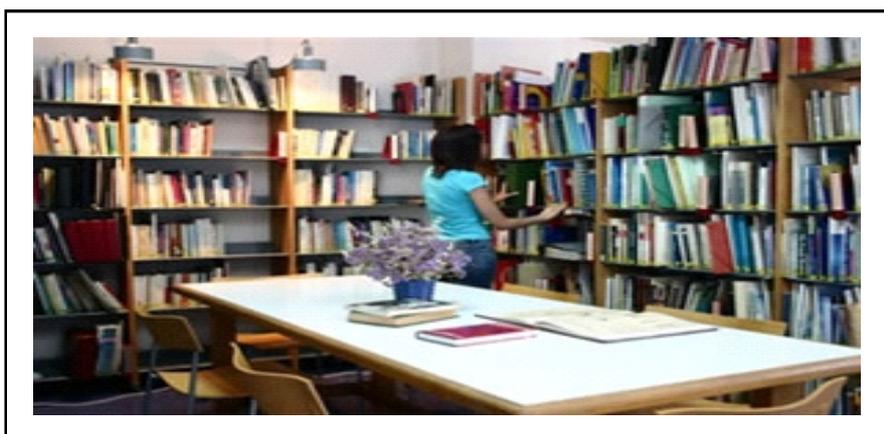
The SU library administration has put the camera in the following locations to cover the maximum library area:

- a) Reception and Entrance:- One camera is placed for entrance and reception which are covering all the activities on ground floor. (Fig. 7)



**Figure 7: Camera in the entrance and reception area of SU Library**

- b) Reading Section: - There are six cameras in order to see the reading room section those are 1<sup>st</sup> floor, 2<sup>nd</sup> floor and 3<sup>rd</sup> floor. (Fig. 8)



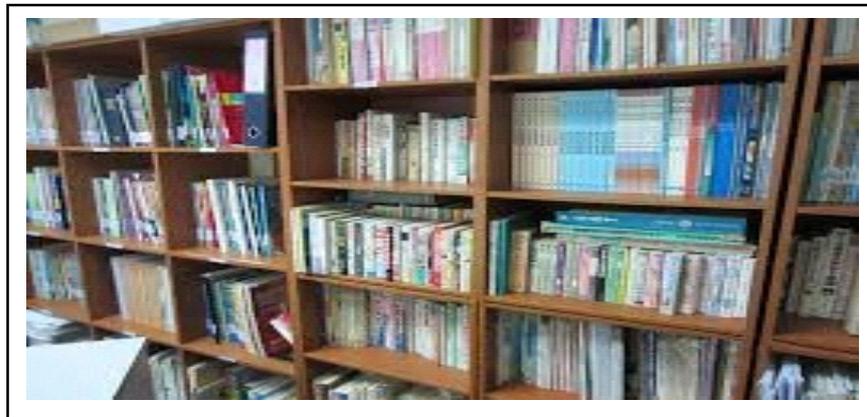
**Figure 8: Cameras in the Reading Room of SU Library**

c) Library Stack Section 1<sup>st</sup> floor: - These two cameras on both the ends to see who is moving inside the stack. (Fig. 9)



**Figure 9: Cameras in the 1st floor Stack Room of SU Library**

d) Library Stack Section 2<sup>nd</sup> floor: - These two cameras on both the ends to see who is moving inside the stack. (Fig. 10)



**Figure 10: Cameras in the 2nd floor Stack Room of SU Library**

e) Reference cum reading room section: - Two cameras are covering the types of the movement in reading room inside the reference stack section. (Fig. 11)



**Figure 11: Cameras in the Reference cum reading room section**

f) Periodical Room: - This room is situated on top floor of the library. There are two cameras which are covering the movement inside the room. (Fig. 12)



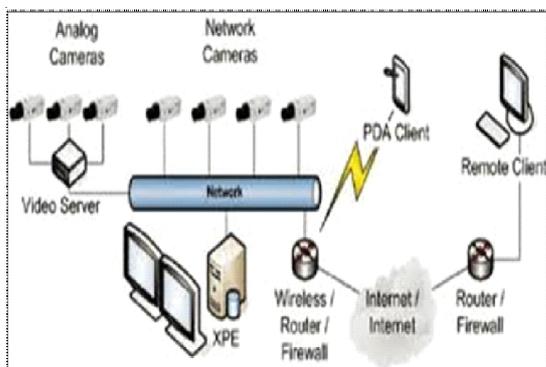
**Figure 12: Cameras in the Periodical Reading room**

In the Sikkim University library all the cameras are connected together with a multiplexer to share videos.

#### **8. Architecture Of Sikkim University Setup CCTV Network**

The Sikkim University Library has the CCTV camera network and computer network. (Fig. 13) The CCTV camera network consists of 15 cameras, one multiplexer, one time lapse and one monitor (Sony Color TV set) for use. As per Figure 13, all cameras capture live video from various locations of the library

and pass it on to the multiplexer. The function of the multiplexer is to combine all camera video lines and pass it to the time lapse recorder to record the video. The setup has parallel facility to redirect video to the analog television set. The time lapse recorder has the facility to select specific channels for repeated use so that the librarian can view some camera output for long time. The installed cameras have the support of remote control so that we can zoom the image of video.



**Figure 13: Network architecture of Sikkim University Library**

The important features of the library CCTV cameras system is that the analog outputs of the CCTV camera are also redirected to the TV tuner card of a computer system which is already connected to the computer network. This figure shows the computer desktop which has TV tuner card which can also view the live video to the server hard disk which can be seen later on all other networked computers as well as on parallel with the help of video sharing software. Sikkim University has the NAS (Network Attested Storage) server of 200 GB data storage for electronic thesis, audio and video tutorial and for digital video recording of the CCTV cameras. The TV tuner card and its software automatically record the video recording so that recording file size can be controlled.

The University library has already installed a computer network for management and administration of library work. In this network, the library has one Windows NT server for mass storage of thesis and other audio and video data tutorials. There are ten clients for various library activities like for issue return, periodicals, book entry, etc.

## 9. Conculison

Library is the heart of any academic institution as it provides its users with literature and information in the form of books, journals and other electronic media. While providing such facilities, libraries are also facing the problems of document theft and mutilation. To overcome the security problem, Sikkim University Library has installed the CCTV cameras for user level security. There are various types of cameras available in the market such as - Coax cable based CCTV camera, UTP cable based CCTV cameras, IP based CCTV cameras, etc. The Sikkim University Library has selected coax cable based CCTV and IP based camera system solution and redirected the output to TV tuner card to digitally record video on computer network.

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